Abstract of the Disclosure

A biosensor device for detecting small molecules analytes is provided. The device employs a first class of molecules, e.g., protein that binds to both the analyte and a second class of molecules, e.g., nucleic acid. The binding of the protein to the analyte and nucleic acid can be mutually exclusive, and the presence of analyte in a sample results in a detectable displacement of protein from nucleic acid. Alternatively, binding of the protein to the nucleic acid can depend on the presence of analyte in the sample. In a specific embodiment, either the protein or nucleic acid is immobilized on a solid phase support. An arsenic detection system is exemplified. An ArsR binding sequence from the *E. coli ars* operon is immobilized on a gold-plated surface. ArsR protein binds to the DNA in the absence of arsenic, and is released in the presence of sodium arsenate or phenylarsine oxide. Protein release results in a change in surface plasmon resonance, and the magnitude or kinetics of the change indicate the concentration of arsenic.